

2.0 HIGHWAY-RAIL CROSSING INVENTORY NUMBER

2.1 Background

In 1974, an effort was undertaken to inventory and assign a unique number to all public and private highway-railroad intersections and pedestrian crossings in the United States. As a part of the original inventory, data were collected for all public, private, and pedestrian crossings, both at grade and grade separated, including location, operational, physical and classification information.

A National Advisory Committee having representation from all involved parties was appointed to provide technical guidelines for the implementation of the inventory. The Advisory Committee determined the type and extent of the data to be collected. In general, the data elements to be included in the inventory were selected on the basis of their significance to the computation of a priority index for grade crossing improvements.

The railroad industry and each of the States participated in the initial inventory. Following an agreed procedure, the States and railroads continue to submit new and updated crossing information to the Federal Railroad Administration. The FRA, through its contractor, updates and maintains the National Data File. This information is available for public use and may be obtained through the FRA Office of Safety.

In addition to these data, some States and some railroads maintain additional crossing information in their data files. However, these data are not generally available to the public and may be obtained only through the State or railroad maintaining the supplemental information.

In many ways the National Highway-Rail Crossing Inventory number, placed at all public, private, and pedestrian crossings, is similar to a credit card or bank account number. Important information is assigned to the number by State agencies and railroads. Police, accident investigators, project engineers, utilities, States and railroads are but a few of those who refer to these numbers and the connecting data regularly.

The need for accurate information assigned to the appropriate crossing is important in any decision to upgrade existing warning devices. The number of accidents, motor vehicles and trains using the crossing, and the type of warning device are but a few of the data elements that are critical in the computation of a "hazard index" for individual grade crossings. Not only is it important that these data be kept current, but it is also critical that the information be assigned to the proper crossing via the identification number.

In addition to the assignment of data regarding the physical and operational characteristics of a crossing, the inventory number is used on all FRA grade crossing accident reports and warning device malfunction reports. Many States and local jurisdictions use the crossing

number on reports of accidents at or near crossings even when not involving a rail vehicle. All railroads and States use the inventory number on crossing improvement project documents, and railroad crews report near misses and other information regarding a crossing by the inventory number. Some utility companies even use the number to locate rail crossings. All of these factors require the need for displaying the number at the crossing to insure that the information is being assigned to the correct location.

2.2 Uniqueness and Calculation

The crossing inventory numbering system was designed to reduce the possibility of error by insuring that crossing data is recorded for the correct location. The crossing identification number, which consists of a maximum of six numeric digits with a single alpha check character, is placed at crossings on number boards along with the "U.S. DOT-AAR" designation. The number assigned to each highway-rail intersection is unique. It is important for proper identification to have the crossing number permanently displayed and mounted on a number board (Figure 2.1) and it is strongly recommended that it be displayed on both sides of the track at each and every crossing. By referencing this number, all inventory and accident data on file, including data collected by State and local agencies and railroad companies, will have a common link. The identification number serves as a communication reference between railroad companies and public agencies, as well as between individual railroad companies regarding specific crossings.

A simple numeric system requiring the use of a maximum of six digits was adopted by the National Advisory Committee. Some exceptions were made in the numbering system. For example, numbers having the same digit repeated consecutively three or more times were eliminated (e.g., 7777). Also, numbers having three digits or less were not used, and some may have leading zeros. The crossing identification number, with its six numeric digits, has a single alpha check character at the end of the number sequence.

This alpha check character is another feature of the National Inventory number that makes it similar to a credit card. When the inventory numbers are generated, they are accompanied by the check character. Therefore, every time a number is used, it can be validated by the check character. The check is performed as follows:

- a. Add the six individual numbers which result from the products of each of the first six digits times the digit's position in the number stream, with position one being the left-most digit (see Step 1 below).
- b. Subtract multiples of 22 from this total until the remainder is less than 22 (see Step 2 below).
- c. The remainder is then compared against Table 2-1 to find or verify the alpha code.

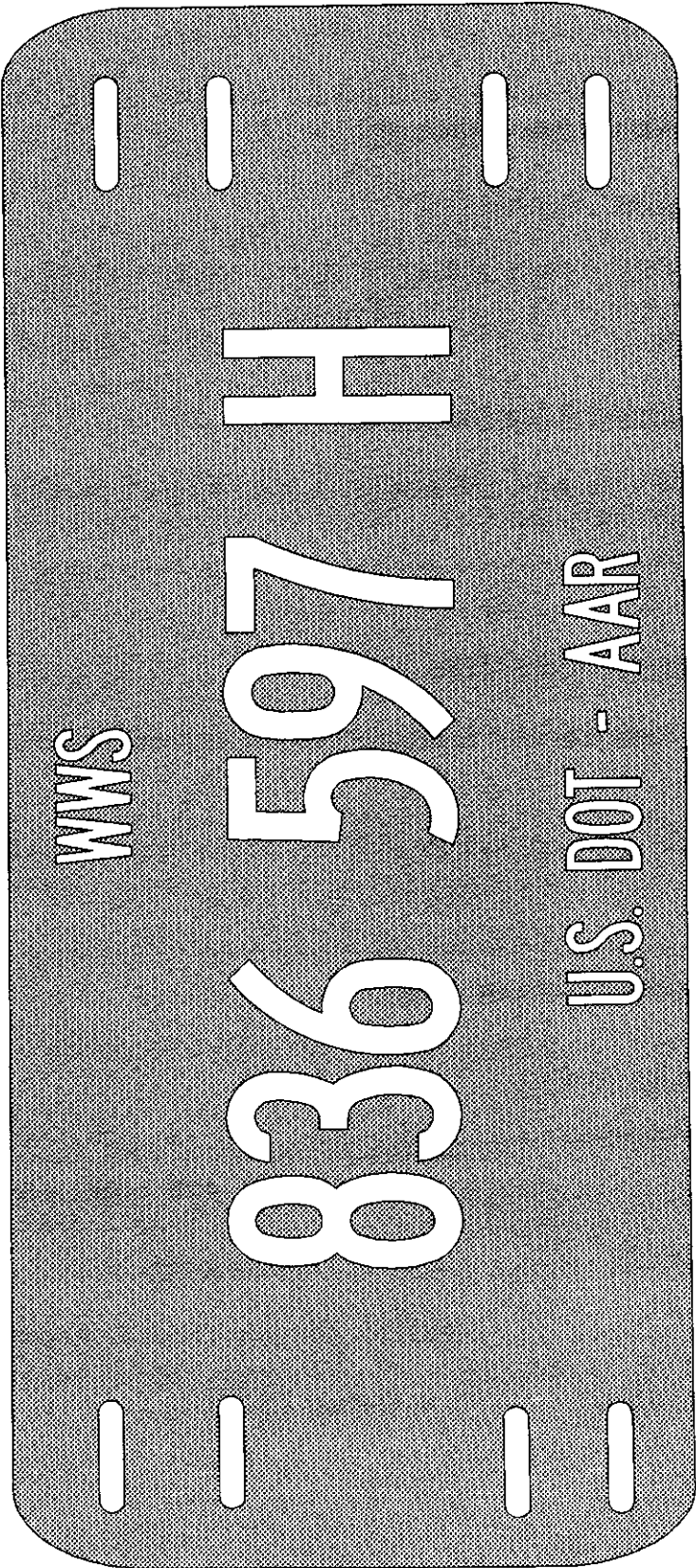


Figure 2-1. National Highway-Rail Crossing Inventory Number and Number Board

EXAMPLE #1

The procedure can be illustrated by validating the inventory number from Figure 2-1 (836 597 H). The validation is done as follows:

Step 1. Compute Numeric Code.

$$\begin{aligned}
 &= [(8 \times 1) + (3 \times 2) + (6 \times 3) + (5 \times 4) + (9 \times 5) + (7 \times 6)] \\
 &= (8 + 6 + 18 + 20 + 45 + 42) \\
 &= 139
 \end{aligned}$$

Step 2. Determine Remainder for Alpha Code.

$$\begin{aligned}
 &= 139 - (\text{subtract multiples of 22 until you get a number that is less than 22}) \\
 &= 139 - (22 \times 6) \\
 &= 139 - 132 \\
 &= 7
 \end{aligned}$$

Step 3. Verify the Alpha Code

The alpha character represented by the number 7 is the letter H (from Table 2-1).

Therefore, the inventory number (836 597 H) has been validated.

EXAMPLE # 2

A second example is shown below:

Crossing Number:	0	7	6	5	2	1	C
Multiplication:	x 1	2	3	4	5	6	
Sum:	0	+14	+18	+20	+10	+6	= 68

Remainder: 68/22 = 3 and remainder of 2

(NOTE: Use long division or subtract multiples of 22.)

Alpha Code: 2 = C from Table 2-1

Remainder	Alpha Code	Remainder	Alpha Code	Remainder	Alpha Code	Remainder	Alpha Code
0	A	6	G	12	N	18	V
1	B	7	H	13	P	19	W
2	C	8	J	14	R	20	X
3	D	9	K	15	S	21	Y
4	E	10	L	16	T		
5	F	11	M	17	U		

Table 2-1. Remainder vs. Alpha Code

2.3 Assignment of Numbers

Every crossing in the United States, including public, private and pedestrian, both at grade and grade separated shall have a crossing inventory number assigned and recorded in the National File. The only exceptions are crossings (1) created to serve specific temporary (six months or less) activities such as construction, and (2) those used only by railroad employees within a railroad yard on railroad property and not available to the general public. In a plant complex or for yard-type locations where there are numerous crossings that are not always distinguishable (e.g., a port or dock area), one number can be assigned to include all crossing areas within the property limits. Such number should be clearly posted at the railroad point of entry.

NOTE:

There should only be one crossing number assigned to a single crossing (defined as the tracks between a pair of warning devices), no matter how many railroads own track that traverses the crossing. There may be cases where two mainline tracks, owned and maintained by two different railroads, traverse a crossing, with each of these railroads having assigned a separate crossing number for the crossing. If this situation exists, one of the numbers should be deleted (closed) and one of the railroads involved should claim the crossing and list the other railroad as "operating across the same crossing."

To identify the owning railroad for a crossing, use the following procedure:

- identify the operating railroad or the railroad that owns the property, or
- identify the railroad that performs maintenance on the crossing, or
- have the railroads jointly decide who will carry the crossing on its inventory.

Any remaining original number "tags" from the 1973-1975 National Inventory Project which have not been assigned to a crossing may be assigned to and installed at new crossings. When this supply is exhausted, the FRA National Highway-Rail Information Center will furnish, upon request, a series of unique numbers to be assigned to newly opened crossings or to crossings that are identified without a number. A railroad or State should request enough numbers to meet their estimated yearly need, including any increase in new crossings. (Tags or number boards are not provided by FRA.)

Railroads and States may address their requests for crossing inventory numbers to:

Federal Railroad Administration
Office of Safety
Highway-Rail Crossing and Trespasser Programs Division
400 7th Street, S.W., (RRS-23)
Washington, D.C. 20590

New numbers are to be used for any new crossings or for any crossings that have been identified as not having an assigned number (a careful and detailed check should be made before assignment of a new number to insure that a prior number was not already assigned). While FRA provides valid usable crossing numbers, it is the railroad or State that actually assigns the number. The actual assignment of a number to a crossing occurs when the number is placed on a completed four-part Inventory Form and the Form returned to FRA for processing into the National File (which takes about three months). It is important that this occur as quickly as possible for any existing crossing that does not have a number. Preparation and submittal of a four-part U.S. DOT-AAR Crossing Inventory Form for such crossings should be expedited.

For a public at-grade crossing, the railroad needs to complete Parts I, II & III. For private crossings, grade-separated crossings (including public) and all pedestrian crossings, only Part I information is required. The railroad retains the fourth sheet (orange) and sends the top three sheets to the appropriate "State Crossing Inventory Contact" (see Appendix A) for completion of Part IV (if the crossing is public at-grade). We suggest that the railroad copy the FRA on the transmittal correspondence. The State will complete Part IV, retain the yellow copy, return the pink copy to the railroad, and forward the green copy to FRA for processing into the National Inventory File. New public at-grade crossing records cannot be entered into the National Inventory File unless all items in Parts I-IV are completely filled in.

A crossing that is moved may or may not retain the same crossing inventory number. The crossing number is unique to a specific crossing and location. If the physical crossing is moved a short distance (usually within several hundred feet) and the operational characteristics do not materially change, the same number may be used at the new location. If this is not the case, the old number should be closed and a new number assigned to the new location.

If a crossing is closed, the closure must be reported to the FRA. Although the crossing will no longer be in use, the number assigned will be permanently associated with the closed crossing in the National Inventory File. It is imperative that the number not be re-assigned to another new crossing. However, if the crossing is re-opened at a later date, the same number would be re-activated and used.

All crossings (public, private, and pedestrian, including grade-separated) must be inventoried and the inventory records should be updated at least once every five years to verify that the crossing still exists.

When there is no record of a crossing number in the U.S. DOT-AAR National Highway-Rail Crossing Inventory, the usual cause is that the crossing was never inventoried or that the original inventory record was never submitted to FRA for input into the National File. It is also possible that the crossing was recorded as closed at some time in the past. Whatever the reason, it is very important that the situation be corrected as rapidly as possible by preparation and submission of a four-part U.S. DOT-AAR Crossing Inventory Form.

When a crossing is located on a county or State line, it is suggested that the crossing be inventoried by and in the county or State that is south or east geographically.

If you have any questions about this process, contact FRA at (202) 632-3312.

2.4 Number Boards

The National Crossing Inventory Number, which consists of six numeric digits and an alpha check character, shall be permanently displayed at all crossings, recommended on both sides of the railroad right-of-way, on number boards in accordance with specifications outlined herein. The FRA does not provide tags or number boards. These may be purchased from suppliers or manufactured by the railroad. In some cases, States have supplied number boards as part of an overall program.

2.4.1 Specifications

The specifications for permanent number boards for the DOT-AAR Highway-Railroad Crossing Inventory System were adopted in 1978 by the National Advisory Committee.

The number board shall be of light-gauge (.032") aluminum, 4" x 9" in size, with eight slots for mounting, and left unpainted so as not to be attractive to vandals. The crossing number shall be embossed in the center with 1-1/2" numeric-alpha characters. The railroad code shall be embossed above the crossing number with 1/2" characters and the Inventory System designation "U.S. DOT-AAR" shall be embossed with 1/2" characters below the crossing number. (See Figure 2-1 for an example.) This type of sign can be considered as an unpainted "license plate" and blanks used for motorcycle tags could be used.

The method of manufacture or procurement of the permanent number board is left to the discretion of the railroads. However, the resulting sign or number board must comply with the general specifications (see Table 2-2). The railroad may fabricate or purchase signs of metal, plastic, or other suitable materials, or may emboss, stencil, paint, or otherwise inscribe the number in the proper location.

- 4 inches high by 9 inches wide
- Made of .032 inch thick aluminum, unpainted
- Pierced with eight slots, four on each side
- 1/2 inch embossed across the top: the railroad code (example: BN)
- 1-1/2 inch embossed across the center: the crossing number (example: 836 597 H)
- 1/2 inch embossed across the bottom: U.S. DOT-AAR
- 2 plates for each crossing are recommended, plus any desired spares

Table 2-2. Number Board Specifications

Crossing number boards can be purchased from manufacturers and fabricators of signs and railroad materials. However, as of January 1994, only one manufacturer was known to supply such number boards as part of their offered products. This manufacturer is identified below for the convenience of short line railroads and others who may not have fabricating facilities, or for those who do not wish to fabricate their own plates. This is not an endorsement of this manufacturer in any way by the FRA.

Keyes-Davis Company
Box 1557, 74 Fourteenth Street
Battle Creek, Michigan 49016
Telephone: (616) 962-7505
Facsimile: (616) 962-4411

Approximate price quotes, as of 10/18/95, for individually numbered plates conforming to the specifications described above are contained in the following table (Table 2-3).

In Quantities of	Price per Board
1-9	\$22.00
10-24	16.50
25-49	12.25
50-99	7.25
100-249	5.75
250-499	4.25
500-999	3.35
1000-2499	2.50
2500-up	1.60

Table 2-3. Number Board Price Quote

2.4.2 Installation and Display

At least one sign shall be located on a signal mast or crossbuck post for crossing and must be clearly visible from the roadway. Ideally, it should also be visible from the rail right-of-way, if possible. While only one sign is required, two signs are recommended, one for each side of the crossing. If a mast or post is not present, the number should be mounted to any type of fixture or structure present, even a wall or the ties. In lieu of a sign, the number could be clearly painted (stenciled) on the masts or posts. As a temporary or alternate measure, spray painting or stenciling can be used on signal cabinets or any other suitable location. The key point to remember, **DISPLAY THE NUMBER AT BOTH SIDES OF THE CROSSING FOR EACH AND EVERY CROSSING.**

There are three important considerations when installing number boards,

- The attachment of the number board should not interfere with the operation of the crossing warning device;
- The number board should be placed (where possible) above the reach of possible vandals; and,
- When attached to posts or poles, the number board should be mounted, whenever possible, so that it is facing the roadway.

There is only one number for a crossing, but it is recommended that two number boards be installed, one on each side of the crossing. Some examples of installation are shown in Figure 2-2.

When number boards are to be mounted on metal poles, a banding tool and metal strap are required. To provide a secure attachment, care must be taken in threading the strapping material through fastening slots in the number board.

Where number boards are to be mounted on wooden poles, galvanized nails or heavy duty staples are required. The minimum number of nails or staples should be four.

The number boards can be mounted on the different fixtures in the following manner:

- a. Crossbucks. The number board should be installed just above eye level using either nails or long staples, or strapping for metal poles.
- b. Mast Mounted or Cantilevered Flashing Lights and/or Gates. The number board should be installed just above eye level using strapping material.
- c. Stop Sign or Other Sign. Where crossbucks or other signals are not present, mount the number board on a metal or wood pole supporting the sign. The number board should be installed above eye level or just below the stop sign.
- d. Post Mount where there are no Signs. Mount the number board on a post at least 5 feet above the ground. Installation on a post is recommended at locations where signs or signals are not installed, such as at private crossings and grade separations. When the sign cannot be installed on a post, the railroad should spray paint or stencil the number on a suitable location and store the number board for later installation, or the number board may be mounted on the nearest railroad-owned signal or communication pole.

2.4.3 Maintenance

To insure identification and verification of a crossing, the display of number boards must be maintained by the railroads at all crossings, especially at public-at-grade crossings. Display and maintenance of signs at private, pedestrian, and grade-separated crossings is also important for identification purposes and should be maintained in the same manner. Number boards should be replaced if the originals deteriorate or are vandalized.

Care must be taken that number boards are not transported to an incorrect location via posts and poles which may be classified as surplus and then re-used at a different location. When posts or poles are taken down, the number boards should be removed and re-installed or destroyed if the crossing is closed. When surplussed (re-used) poles or posts are installed,

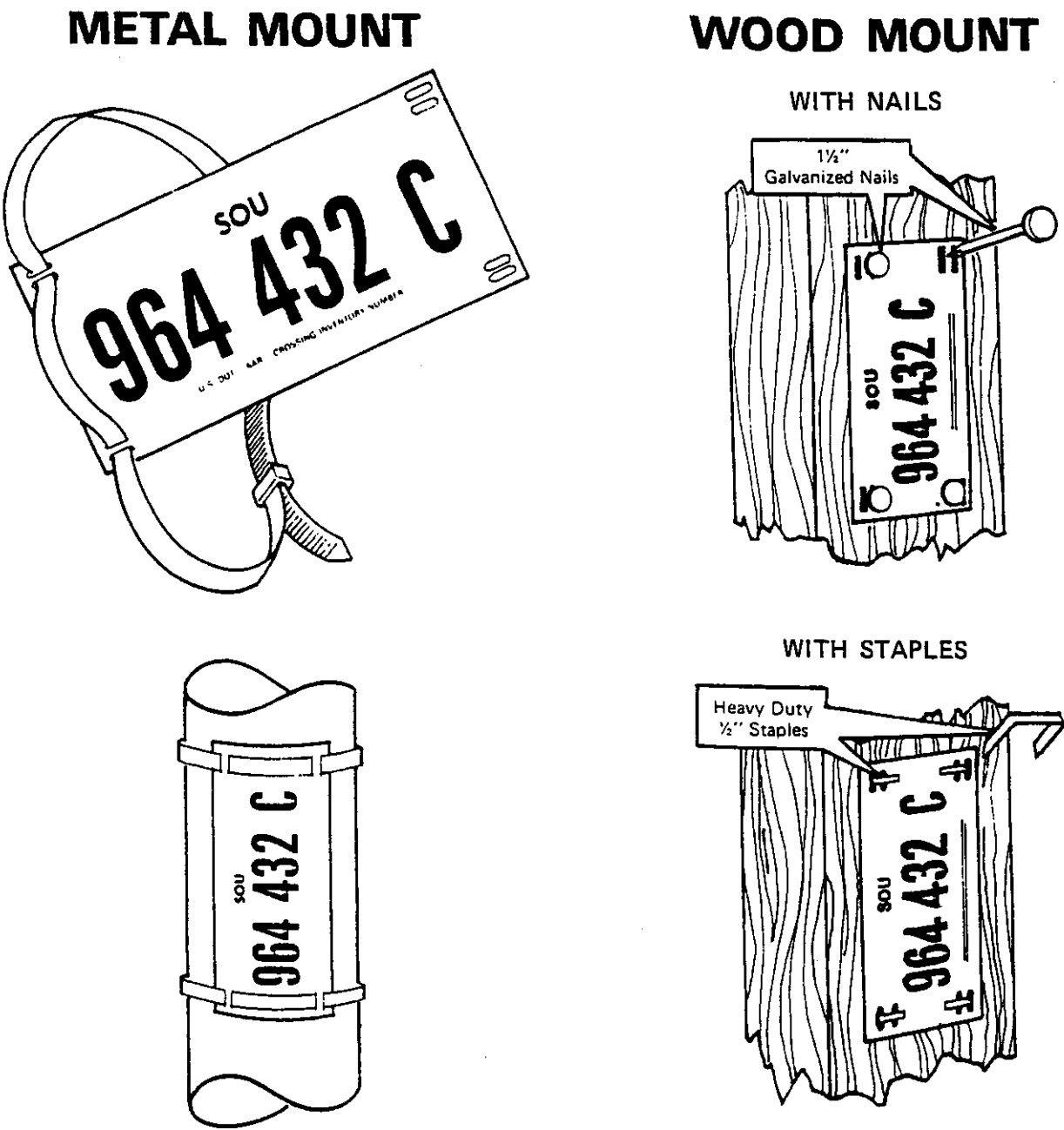


Figure 2-2. Number Board Mountings

the installation crew should insure that these do not contain number boards from other locations.